

Original Article



Dexamethasone for Prevention of Postoperative Shivering: A Prospective Clinical Study

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Abstract

Background: Postoperative shivering (POS) is one of the common problems following general anesthesia and with different unpleasant and stressful consequences for patients. Hence, its proper management is necessary for both prevention and treatment. **Objectives:** The aim of this study was to find out the prophylactic effect of intravenous dexamethasone in preventing postoperative shivering after general anesthesia. **Materials and methods:** Patients aged from 20 to 50 years were taken for study who has been scheduled for elective surgery under general anesthesia and they were randomized into two equal groups. Group I (Dexamethasone group) received intravenous dexamethasone and group II received intravenous saline (Placebo group). Shivering was determined postoperatively and analyzed statistically. **Results:** Patients who had received intravenous dexamethasone, experienced a significantly lower incidence of postoperative shivering compared to placebo group (15% versus 55%, $p < 0.05$). **Conclusions:** The result of this study showed that intravenous dexamethasone can reduce postoperative shivering which was significant statistically.

Key words: Dexamethasone, Postoperative shivering (POS), General anesthesia.

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Introduction

Postoperative shivering has an incidence of 60% following general anesthesia and up to 33% following regional anesthesia.¹⁻³ Shivering is unpleasant and causes several undesirable physiologic consequences such as increase in oxygen consumption, carbon dioxide production, increased chances of myocardial ischemia, infection, bleeding, and increase in the minute ventilation.^{4,5} It also induces hypoxemia, lactic acidosis, increased intraocular pressure, intracranial pressure (ICP), and interferes with patient monitoring such as electrocardiogram, noninvasive blood pressure and SpO₂.^{6,7}

Various methods are available for the control of shivering such as non-pharmacological or pharmacological. Non-pharmacological preventing measures such as fluid warmers,

maintaining ambient operating room temperature, space blankets, surgical drapes, and active circulating water mattress have been used. Pharmacological methods include various drugs such as opioids (pethidine, pentazocine, and tramadol), α 2agonists (clonidine, dexmedetomidine), others such as doxapram, neostigmine and magnesium sulfate have been tried.⁸⁻¹³

It is postulated that, activation of the inflammatory responses and release of cytokines during surgery are considered as the underlying causes of postoperative shivering.¹⁴ Agents with anti-inflammatory activity, such as dexamethasone, could thus reduce the occurrence of postoperative shivering (POS) by decreasing the gradient between core and skin temperature.^{15,16} Since POS is an accompanying part of general anesthesia with different unpleasant and stressful consequences for patients

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undergoing surgery, it seems that its proper management is necessary for both treatment and prevention. The aim of this study was to find out the prophylactic effect of dexamethasone in preventing postoperative shivering in general anesthesia.

Materials and Methods

The present double-blind clinical trial was conducted on 80 patients undergoing elective ENT surgery at National Institute of ENT, Dhaka during November 2017 to February 2018 after obtaining informed consent. Inclusion criteria were age 20-50 years, both male and female, Class I and II American Society of Anesthesiologists (ASA), no history of known skin disease, lack of diabetes or heart, liver and kidney disorders, no history of known allergy to used drugs, no history of addiction to alcohol and oral or injectable drugs. The patients were randomly divided into two groups of 40 after enrolment in the study. Group I was selected for pretreatment with injection dexamethasone 0.15 mg/kg diluted in 5 ml normal saline and Group II were selected for pretreatment with 5 ml normal saline as placebo group just before induction of anesthesia. Prior to surgery, the patients underwent thorough pre-anesthetic check-up and required investigations. Patients were kept fasting for 8 hours.

On arrival to the operating room, standard monitoring was applied to all patients including pulse oximeter, electrocardiogram and noninvasive arterial blood pressure. A 20-gauge intravenous cannula was placed on the dorsum of non-dominant hand of the patient and lactated Ringer's solution was started before anesthesia. Anesthesia was induced by 1.5 mcg/kg fentanyl, 2 mg/kg propofol and 1.5 mg/kg succinylcholine and maintained by halothane in an inspired mixture of 40% oxygen and 60% N₂O after intubation. Vecuronium was administered for muscle relaxation. The patients were mechanically ventilated. Room temperature was set at 22°-24 °C. After completion of surgery muscle relaxant was reversed by neostigmine and atropine then extubated the patient and shifted to recovery room. Heart rate, blood pressure and body temperatures were measured every 5 minutes interval throughout the intraoperative and postoperative period. Patients were observed for shivering in postoperative period as per shivering scale described by Crossley and Mahajan¹⁷ and Tsai and Chu.¹⁸

Grading scale of postoperative shivering validated by Crossley and Mahajan¹⁷ and Tsai and Chu¹⁸

0= No shivering.

1= Piloerection or peripheral vasoconstriction but no visible shivering.

2= Muscular activity in only one muscle group.

3= Muscular activity in more than one muscle group but not generalized shivering.

4= Shivering involving the whole body.

Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and

percentage. The following tests were done: Independent-samples t-test of significance was used when comparing between two means. Chi-square test of significance was used in order to compare proportions between two qualitative parameters. P-value <0.05 was considered significant. P-value >0.05 was considered insignificant.

Results

There was no significant difference in terms of age, body weight, sex, ASA status, hemodynamics and temperature between the groups (Table I). In group I six (15%) out of the 40 patients had postoperative shivering (POS), whereas 22 (55%) out of the 40 patients had POS in group II (P<0.05). Grade 1 POS was lower number of patients in group I when compared with group II (4 versus 12; P<0.05). Grade 2 POS was also lower number of patients in group I when compared with group II (2 versus 7; P<0.05) and grade 3 POS was only present in group II (0 versus 3; p<0.05). There was no grade 4 POS in either of the two groups (Table II). The baseline values of systolic and diastolic blood pressure, heart rate and temperature in both groups were similar and there was no any adverse effect.

Table I: Demographic and operative details of patients between Dexamethasone and Placebo group

Demographic and operat details	Group I (Dexamethasone group) n=40	Group I (Placebogroup) n=40
Age (Years)	37.24±9.52	36.94±8.26
Weight (Kg)		
Sex M/F	64.23±7.67	65.78±6.92
ASA physical status I/II		
Mean basal heart rate (bpm)	24/16	25/15
Mean basal systolic BP (mm Hg)	36/4	35/5
Mean basal diastolic BP (mm Hg)	82.8±7.4	81.3±8.6
Mean duration of surgery (min)	118.8±9.6	116.3±8.9
Mean body temperatures during surgery (°C)	36.37±0.37	36.9±8.2
Mean body temperature in recovery room (°C)	36.48±0.46	36.32±0.36
		36.45±0.43

Table II: Incidence and severity of postoperative shivering

Postoperative shivering (POS)	Group I (Dexamethasone group) n=40	Group II (Placebo group) n=40	pvalue
Incidence of POS number (%)	6 (15%)	22 (55%)	p<0.05
Grading of POS number (%)			
0 □ □	34 (85%)	18 (45%)	p<0.05
1	4 (10%)	12 (30%)	p<0.05
2	(5%)	7 (17.5%)	p<0.05
3	0	3(7.5%)	p<0.05
4	0		0 -

Discussion

Postoperative shivering is one of the common problems following general anesthesia and may lead to multiple complications. Several medications have been suggested for the prevention and treatment of shivering.

The present study shows valuable preventive effect of dexamethasone on postoperative shivering compared to placebo group, here dexamethasone group six (15%) out of the 40 patients had postoperative shivering (POS), whereas 22 (55%) out of the 40 patients had POS in placebo group ($P < 0.05$). Grade 1 POS was lower number of patients in dexamethasone group when compared with placebo group (4 versus 12; $P < 0.05$). Grade 2 POS was also lower number of patients in dexamethasone group when compared with placebo group (2 versus 7; $P < 0.05$) and grade 3 POS was only present in placebo group (0 versus 3; $p < 0.05$). There was no grade 4 POS in either of the two groups.

Khosravi et al.¹⁹ had a study on prevention of postoperative shivering with dexamethasone and found 12% patients experienced postoperative shivering in contrast 31% patients in control group. A study done by Bakry et al.¹³ on postoperative shivering prevention by pretreatment with dexamethasone and pethidine. They observed 20% and 23.4% patients had POS in dexamethasone and pethidine group respectively. Another study done by Lee et al.²⁰ on prevention of POS using ramosetron and dexamethasone plus ramosetron and observed POS in 19% and 3% patients respectively.

The present study shows 15% patients had postoperative shivering in dexamethasone pretreated cases, but the results of Khosravi et al.¹⁹ and Bakry et al.¹³ are 12% and 20% respectively, so the present study result is in between the above two study results and nearly similar.

Conclusion

Intravenous dexamethasone 0.15 mg/kg body weight could effectively decrease the incidence and severity of postoperative shivering.

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